

REMARKS

Claims 1-10 and 12-31 are pending in the present application. Claims 1, 6, 22, 23, 25 and 30 are independent. Claim 11 has been canceled, the subject matter of which has been incorporated into claim 1. Claims 6-8, 16-21, 30, and 31 have been withdrawn from consideration. Reconsideration in view of the above amendments and following remarks is respectfully requested.

Claim Rejections

Claims 1-5, 9-15, and 22-29 have been rejected under 35 U.S.C. §102(b) as being anticipated by Yuzaburo (JP 10-321942 A). Applicants respectfully traverse this rejection.

Claim 1

Claim 1, as amended, is directed to a semiconductor laser device, and in particular a semiconductor laser device having an optical guide layer, having a thickness of 30nm or 35nm, disposed between a cladding layer and a quantum well active layer. Applicants respectfully submit that JP 10-321942 fails to teach or suggest at least wherein the optical guide layer has a thickness of 30nm or 35nm.

JP 10-321942 teaches a multiple quantum well layer 16 disposed between a pair of cladding layers (14 and 19), and an optical guide layer (17) disposed between at least one of the cladding layers (e.g., 19) and the quantum well active layer (16); or, in the alternative optical guide layer 15 disposed between cladding layer 14 and quantum well active layer 16. Further, JP 10-321942 discloses a diffusion preventing layer 18

disposed between the optical guide layer 17 and cladding layer 19, having an interface between the diffusion preventing layer and optical guide layer. Further, each of the optical guide layers 15 and 17 has a thickness of 100 nm (JP 10-321942, second column of page 3).

Requirements for Anticipation

Anticipation is established only when a single prior art reference discloses, expressly or under the principles of inherency, each and every element of a claimed invention as well as disclosing structure which is capable of performing the recited functional limitations. RCA Corp. v. Applied Digital Data Sys., Inc., 730 F.2d 1440, 1444, 221 USPQ 385, 388 (Fed. Cir.); cert. Dismissed, 468 U.S. 1228 (1984); W.L. Gore and Assoc., Inc. v. Garlock, Inc., 721 F.2d 1540, 1554, 220 USPQ 303, 313 (Fed. Cir. 1983), cert. Denied, 469 U.S. 851 (1984).

Applicants submit that because JP 10-321942 discloses a thickness of 100 nm for the optical guide layers, it does not anticipate the claimed optical guide layer having a thickness of 30 nm or 35 nm. Accordingly, Applicants respectfully request that the rejection of claim 1, as well as dependent claims 2-10 and 12-15, be withdrawn.

Claims 22 and 25 further recite a limitation of a carrier concentration at an interface between the spacer layer and the optical guide layer of more than $5 \times 10^{16} \text{ cm}^{-3}$ and less than $5 \times 10^{17} \text{ cm}^{-3}$. The Office Action alleges that such a limitation is inherent in JP 10-321942 because the spacer layer is not intentionally doped to have a higher carrier concentration. Applicants disagree.

The Legal Requirements for Inherency

To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily

present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill. Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient." *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999). "In relying upon the theory of inherency, the examiner must provide a basis in fact and/or technical reasoning to reasonably support the determination that the alleged inherent characteristic necessarily flows from the teachings of the applied prior art." *Ex parte Levy*, 17 USPQ2d 1461, 1464 (Bd. Pat. App. & Inter. 1990). Once a reference teaching a product appearing to be substantially identical is made the basis of a rejection, and the examiner presents evidence or reasoning tending to show inherency, the burden shifts to the applicant to show an unobvious difference. "The PTO can require an applicant to prove that the prior art products do not necessarily or inherently possess the characteristics of his claimed product. Whether the rejection is based on 'inherency' under 35 U.S.C. 102, on '*prima facie* obviousness' under 35 U.S.C. 103, jointly or alternatively, the burden of proof is the same." *In re Fitzgerald*, 619 F.2d 67, 70, 205 USPQ 594, 596 (CCPA 1980).

Applicants submit that the Office Action has not presented evidence that the alleged inherent characteristic necessarily flows from the teachings of the applied prior art. The claim does not recite the carrier concentration of the spacer layer, but a specific range for the carrier concentration at an interface between the spacer layer and the optical guide layer. Based on results as shown in Figure 3, Applicants have determined that either the threshold current or the operational voltage increases abruptly when the carrier concentration at the interface is outside the claimed range (Specification, page 16, lines 4-13). Because JP 10-321942 does not teach carrier concentration ranges, and much less carrier concentration at an interface of the spacer layer, Applicants

submit that there is insufficient evidence of inherency of the claimed range. Accordingly, Applicants submit that, at least for this reason, each and every element of claims 22, 25, as well as dependent claims 27 and 29, are not taught or suggested in JP 10-321942.

Claim 23 is directed to a semiconductor laser device, and in particular, to a semiconductor laser device having a spacer layer consisting of a single layer of a thickness of 5nm or more but below 10 nm disposed between the optical guide layer and a p-type cladding layer. The Office Action does not specifically address the limitations in this claim.

Applicants have found that if the thickness of the spacer layer is too large, the carrier concentration at the cladding layer 8 on a hetero-interface decreases, and as a result a carrier barrier also decreases. Consequently, the temperature characteristic of the semiconductor laser device deteriorates (Specification, page 17, lines 4-18). JP 10-321942, on the other hand, discloses a diffusion preventing layer of many alternate layers providing evidence that they did not realize the benefit of keeping that layer below 10 nm. Specifically, JP 10-321942 discloses a diffusion preventing layer 18 formed of alternate layers of AlN and GaN. Each of the layers is disclosed as ranging in film thickness of 1 atomic layer to 10 atomic layers (e.g., see paragraph 0022). There is no disclosure of the total thickness of the diffusion preventing layer 18. Accordingly, Applicants submit that JP 10-321942 fails to teach each and every element of claim 23, as well as dependent claims 24, 26, and 28.

Therefore, Applicants submit that JP 10-321942 fails to anticipate the invention of claims 1-5, 9, 10, 12-15, and 22-29, and respectfully request that the rejection be

withdrawn.

CONCLUSION

The Examiner is respectfully requested to reconsider and withdraw the corresponding rejections of claims 1-5, 9, 10, 12-15, 22-29 at least for the above reasons.

Favorable reconsideration and an early Notice of Allowance are earnestly solicited.


In the event there are any outstanding matters remaining in this application, the Examiner is invited to contact Robert Downs at (703) 205-8000 in the Washington, D.C. area.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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Attachments: Marked up copy of the claims

Marked-up copy of the Claims

Claim 11 has been canceled.

Claim 1 has been amended as follows:

1. (Three Times Amended) A semiconductor laser device having a quantum well active layer disposed between a pair of cladding layers, and an optical guide layer disposed between at least one of the cladding layers and the quantum well active layer,
wherein a spacer layer is provided between said optical guide layer and said at least one of the cladding layers, said spacer layer having an interface between the spacer layer and said optical guide layer, and
wherein said optical guide layer has a thickness of 30nm or 35nm.